Ministry of Environment and Energy

FOR YOUR information

MARCH 1994

Stage 1 Vapour Recovery Systems

Ground-level ozone

Ground-level ozone is formed when nitrogen oxides (NO_x) and volatile organic compounds (VOCs) react together with sunlight. At ground level, ozone is damaging to the environment since it is a major ingredient of smog. Short-term exposure to ground-level ozone can irritate the nose and throat, causing coughing and pain or difficulty in breathing. Ground-level ozone damages plants, reducing growth and productivity. Materials such as rubber, textiles and plastics are also damaged when exposed to high levels of ozone.

About 60 per cent of total NO_x emissions originate from transportation - cars, trucks, planes and trains. Transportation is also responsible for 40 per cent of VOCs emissions. Products containing solvents, such as surface coatings, aerosol sprays, cleansers, etc. account for an additional 40 per cent of VOCs emissions.

More than 50 per cent of the ground-level ozone problem in Ontario is caused by transboundary flows of pollutants from neighboring U.S. states.

Ground-level ozone reduction plan

Ontario is committed to ground-level ozone reduction and is an active participant in the Canadian Council of the Ministers of the Environment (CCME) and its phase one NO_x/VOCs Management Plan.

In 1990, the CCME recommended that by the year 2000 there be a 25 per cent reduction from 1985 levels in emissions of nitrogen oxides and volatile organic compounds in the Southern Ontario Corridor (the area south of a line joining Arnprior, north of Ottawa, to Grand Bend, north of Sarnia). Ontario, other provinces and the federal government agreed to a NOx/VOCs Management Plan for an ozone-reduction effort.

As a leader in the battle against smog, the Ontario government already has taken some initiatives to reduce ground-level ozone. For example, the Ministry of Environment and Energy has introduced the following initiatives to reduce NO_x/VOCs emissions:

- A regulation restricting the volatility of gasoline to 10.5 pounds per square inch during the summer months.
- An Ontario Hydro commitment to reduce 1985 NO_x emissions by at least 40 per cent by the year 2000.
- A new federal-provincial air quality advisory issuing public warnings of high ground-level ozone episodes.
- Transit, building code and taxation initiatives to reduce energy use and minimize energy-related emissions.
- Recently announced draft regulations requiring training for dry cleaners in minimizing VOCs emissions from cleaning chemicals.

To meet the CCME recommendation, Ontario must reduce the emissions of VOCs by 165,000 tonnes annually from the 1985 levels. Existing commitments such as reductions in gasoline volatility and energy efficiency measures have already reduced VOCs emissions by 18,000 tonnes annually.

Gasoline vapour

Gasoline is a complex chemical made up of about 200 compounds. When transferred from a storage tank to a truck and back to an underground storage tank at the retail station, it releases gasoline vapour into the air. According to the manufacturer of the vapour recovery equipment, for every 1,000 litres of gasoline transferred from one source to another, it is estimated that two to three litres of gasoline that escape into the air as vapours could be recovered.

Stage 1 Vapour Recovery System: The draft regulation

All gasoline distribution terminals (primary), bulk plants (secondary), service stations (retail) and tank trucks delivering gasoline will be required to install vapour recovery systems to capture the gasoline vapour displaced during fuel transfers to tank trucks or storage tanks.

The Stage 1 Vapour Recovery regulation applies to all fuel distribution terminals and bulk plants, service stations and tank trucks operating in the Southern Ontario Corridor.

There are about 5,355 service stations in Ontario. The Stage 1 Vapour Recovery regulation applies only to southern Ontario service stations, which account for about 4,055 stations.

Exemptions

The following facilities will be exempt from the regulation:

- all farm operations;
- all service stations distributing less than one million litres of gasoline per year (about 800 out of 4,000 service stations in southern Ontario);
- off-shore marinas, aviation gasoline outlets, ship and barge loading/ off-loading, railcar loading/ off-loading;
- tank trucks with a capacity of less than 21,000 litres. This exemption will allow about 50 per cent of the tank trucks currently in service to operate without Stage 1 controls. These smaller trucks operate in the more rural, remote areas and provide a valuable community service. Many of these supply trucks are used to distribute other types of fuels such as furnace oil and diesel fuel which do not create a vapour release problem.

It is expected that the average cost of installing the equipment will be $2 million at terminals and $10,000 for trucks. At service stations, costs could be as low as $300 to $500 per storage tank but could rise to $10,000 when excavation or renovation costs are included.

In anticipation of the regulation for NOx/VOCs reduction, the Canadian Petroleum Products Institute members, who represent oil companies in Ontario, have voluntarily installed the necessary equipment on six of the 15 largest gasoline distribution terminals, five bulk plants, at more than 1,000 service stations and on 80 per cent of their company-owned tank trucks.

The regulation will apply to distribution facilities and trucks operating in the Golden Horseshoe by Dec. 31, 1996 and by Dec. 31, 1997 for facilities in the rest of the Southern Ontario Corridor.

Benefits

The discharge of volatile organic compounds into the atmosphere will be reduced by about 19,000 tonnes per year. Reductions in emissions of gasoline vapour will also result in lower emissions of toxic air pollutants. This will improve air quality, especially in areas near facilities where refilling of underground gas tanks takes place.

This initiative will reduce ground-level ozone production by reducing emissions of contaminants. It will also reduce human exposure to the contaminants.

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